



PAT June, 2013; 9 (1):159- 166 ISSN: 0794-5213

Online copy available at

www.patnsukjournal.net/currentissue

Publication of Nasarawa State University, Keffi



Effect of Castor Oil Seed Meal on Semen Characteristics of Nigerian Indigenous Cocks

*Ladokun A O¹, Abiona J A¹, Otite J R², Sokunbi O A² and Anjugu S³

1. Dept of Animal Physiology, FUNAAB

2. Dept of Animal Science University of Ibadan

3. Dept of Animal Science Nasarawa State University, Keffi

*author for correspondence bimboladox@gmail.com

Abstract

Castor oilseed meal was administered to Nigerian indigenous cocks (Normal Feathered) by two methods: through drinking water and feed to investigate its possible effects on semen characteristics. The cocks were assigned to 3 treatments: T1 control (No castor oil seed in water or feed), T2 (castor oil seed blended and mixed with drinking water), T3 (castor oil seed meal added to the already compounded feed). A total of 60 cocks were used (20 per treatment) with each treatment having 2 replicates of 10 birds each in a completely randomized design in an experiment that lasted for 8 weeks. At the end of 4th week, cocks were trained by hand massage method for semen collection. On the 8th week, cocks were ejaculated daily for 5 days. Semen characteristics evaluated included colour, volume, mass activity (motility), concentration, abnormality and live to dead ratio. The results obtained show that addition of castor oil seed meal in water or feed highly significantly ($p > 0.01$) decreased the semen characteristics considered such as motility. Colour was not altered by Castor oil seed inclusion. Semen Volume was similar for control group of cocks and those with Castor oil in feed, while it was greatly reduced for the group with castor oil seed in water. The study concluded that castor oil seed added to grower mash fed to cocks did not affect semen production in the cocks, but that added to water showed that semen production was depressed suggesting that substances deleterious to semen were released in water, but prevented from expression in the feed.

Key Words: Semen, Normal Feathered, Cocks, Castor Oil Seed

Introduction

The male chicken is known to be responsible for fertilizing the eggs of a number of females, most studies concerning the reproductive efficiency of the layer breeder birds have centre on the cocks. Artificial insemination of caged breeder hens for the production of hatchable eggs is one method showing promise in improving reproductive efficiency (Fuquay and Renden 1989; MacDaniel 1994 and McCartney 1996). In addition, semen can be extended so that with AI more females can be inseminated per male, than would be the case with natural mating; hence fewer males need to be retained. The benefits of AI might not be realized when the number of spermatozoa per ejaculate obtained from male is low, while the ratio of

males to females is high. Total sperm per ejaculate is a function of sperm concentration and semen volume. Therefore the decision to retain or cull specific males based on semen quality characteristics such as semen volume and sperm concentration is based on the assumption that cocks will rank similarly for these characteristics regardless of possible differences in feeding regime. Castor oil seed or beans (*Ricinus communis*) have been implicated in poisoning, though its oil has several industrial and commercial uses (Vaibhav *et al.*, 2007 and Anjugu, 2007). Though this plant has been implicated, some Fulani herdsman in North Central Nigeria have been found feeding the blended beans or seeds to chickens (Anjugu, 2007)! The report on this seeds in the last century has re-considered the earlier claims of its extreme toxicity (Rauben and Heard, 1985). This study therefore looks at the effect of feeding castor oil seed on semen quality characteristics of some Nigeria indigenous cocks

Materials and Methods

Selection and management of birds

A total of 60 cocks, consisting of nine month old Nigerian indigenous breed (normally feathered) were randomly distributed into three (3) groups viz: Treatment 1[No castor seed was added either to water or water (control)]; Treatment 2 (60g of castor seed was ground and mixed with water served); Treatment 3 (60g of castor seed ground and added to compounded feed). The groups though balanced for weight, consisted of two replicates of 10 cocks each. The cocks were kept in deep litter at the poultry unit of the Teaching and Research farm, Nasarawa State University, Keffi.

The cocks were fed compounded ration at the rate of 130g per cock per day. Water was given *ad libitum*.

Training of birds and semen collection

Semen was collected by the double handed massage method as described by Burrows and Quinn (1935 and 1937) as modified by Gbadamosi (1997). The cocks were given a daily pre-experiment training period of four (4) weeks to get them acquainted with the collection method. Though, the training and feeding lasted for eight (8) weeks the actual semen collection lasted five (5) days.

Semen parameters monitored

Physical characteristics evaluated include: colour, volume, mass activity, motility, sperm concentration, percentage live-dead, abnormal sperm cells and incidence of foreign materials.

Colour was visually appraised from the eppendorf tubes (containing semen samples) placed against a plain piece of paper. Volume was read off on the eppendorf tubes to the nearest 0.01ml and recorded. Mass activity was determined by placing a drop of undiluted semen on a clean defatted slide and examining under microscope at low power for intensity of wave motion (+ to +++). Concentration was determined using the improved Neubaur haemocytometer (red cell grid) after counting under microscope. Percent live-dead ratio was estimated by making semen smear on a slide and then staining with eosin-nigrosin stain. Those cells that absorbed stain were adjudged dead as at the time of staining.

Data Analysis

Data obtained were subjected to one-way analysis of variance (ANOVA) using GENSTAT and descriptive statistics using charts.

Results and Discussion

Table 1 shows average final live weights of experimental birds. The results show that birds in group 2 (Castor seed served mixed with water) had higher and significant weight (1.84 kg) compared to control (1.55 kg) and the birds in group 3 (1.46 kg) in which castor seed was served to birds with compounded ration. This result indicate that the castor seed as served with water was tolerated by the birds and even resulted in higher and significant weight gain than even the control group. Table 2 shows the results of the ejaculate volume of experimental cocks. The observed increase in liveweight in T₂ indicated an increase in growth rate and subsequent final weight of the experimental birds. There have been reports of reduced growth response in poultry due to residual effect of castor allergen in castor bean meal based diets (Okorie *et al.* (1987); Margeret *et al.*, 1979). The decrease in liveweight in the cock whose castor oilseed meal was administered in feed implied a reduction in growth rate and subsequent final weight of the experimental birds. The decrease in growth rate is in agreement with the findings reported by Odunsi *et al.* (2005) in line with the reports of Dagbir *et al.* (1980) on cultivated sunflower meal as well as Dutta *et al.* (1986) on wild sunflower meal. This observation could be explained by the bulkiness of the feed, which made it difficult for the birds to satisfy their protein and energy requirement. Table 3 and 4 show the gross and proximate composition of the diet fed the experimental cocks. Presence of this oil may initiate strong bond among the feed molecules thus making it difficult to release these components during digestion. Moreover, the low palatability of castor oil seed meal in the feed could also be an attending factor responsible for reduction in the

consumption of the experimental feeds (Odunsin *et al.*, 1999; Olaniyi *et al.* 2006; Farinu *et al.*, 2005).

Table 1: Live Weight of Cocks

Treatment	Live weight (kg)
T ₁	1.55
T ₂	1.84
T ₃	1.46
Mean	1.62
Significance	0.036
S.E	0.009
LSD	0.294
CV (%)	16.10

* Significant at 5% T₁=No castor seed cake in water or feed T₂ = Castor seed cake in water T₃= Castor seed cake in feed

Table 2: Volume of Ejaculate (ml)

Treatment	Ejaculate Volume
T ₁	0.554
T ₂	0.278
T ₃	0.544
Mean	0.525
Significance Treatment	0.001***
Days	0.001***
Treated days	0.001***
LSD	4.55
CV	17.5

*** Significant at <1% T₁=No castor seed cake in water or feed T₂ = Castor seed cake in water T₃= Castor seed cake in feed

Table 3: Progressive motility of spermatozoa from Experimental cocks

Treatment	Progressive Motility (%)
T ₁	39.84
T ₂	29.88
T ₃	11.02
Mean	26.91
Significance Treatment	***
Days	***
Treated days	***
LSD	4.555
CV	17.5

*** Significant at <1% % T₁=No castor seed cake in water or feed T₂ = Castor seed cake in water T₃= Castor seed cake in feed

Table 4: Percentage Abnormal Spermatozoa

Treatment	Abnormal Spermatozoa
T ₁	15.80
T ₂	19.12
T ₃	17.60
Mean	17.51
Significance Treatment	***
Days	***
Treated days	***
LSD	2.037
CV	13.80

*** Significant at <1% T₁=No castor seed cake in water or feed T₂ = Castor seed cake in water T₃= Castor seed cake in feed

However, the increase in weight in the birds that had their castor oil seed meal in water may be due to the fact that castor oil seed meal had higher palatability than that offered in the feed and therefore the birds obtained more nutrients in the castor

oil seed meal in the water. This also implies that the birds can tolerate castor oil seed meal offered in water than that included in the feed.

The ejaculate volume in the cock with no castor seed cake in water or feed was higher than those with castor seed cake in either feed or water. Results of this study clearly indicated that dietary supplementation with castor oil resulted in significant reduction in the volume of ejaculate. This observation may be as a result of presence of anti-nutritional factors such as ricin and allergen (Audi *et al.*, 2005) which may alter spermatogenesis and vesicular glands secretions. The worst results for ejaculate volume were recorded in the cocks that were given castor oil seed cake in the water (Fig. 1).

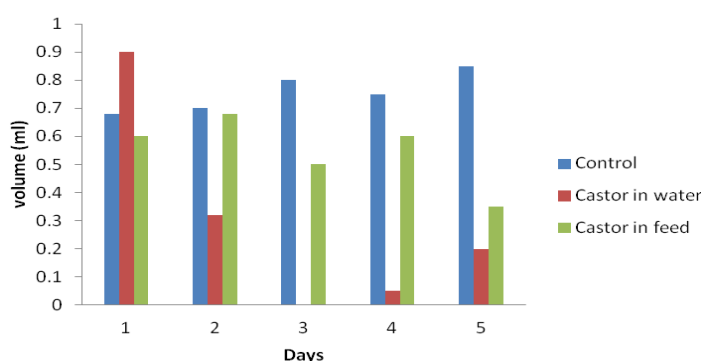


Figure 1. Effect of Castor seed Meal on Cocks ejaculate volume

Sperm output and quality are influenced by the nutritional status of farm animals (Oyeyemi *et al.*, 2002). The ejaculate volume in T₁ and T₃ were much higher than those reported for Anak cocks by Odo *et al.* (2000) while that of T₂ was higher than that reported by Udeh and Mmerole (2005) (0.08 mL), but slightly lower than that obtained for Anak and Harco breeder males (0.34 mL) of similar ages by Gbadamosi and Egbunike (1999).

The motility of the spermatozoa from the cock in the control group was higher than those that were given castor seed meal (Fig. 2). It may be assumed that consumption of castor oil seed meal had a temporary or transient inhibition in sperm motility. The mechanism of this physiological inhibition is subject to further investigation. There is paucity of information on the effect of castor oil on the sperm motility.

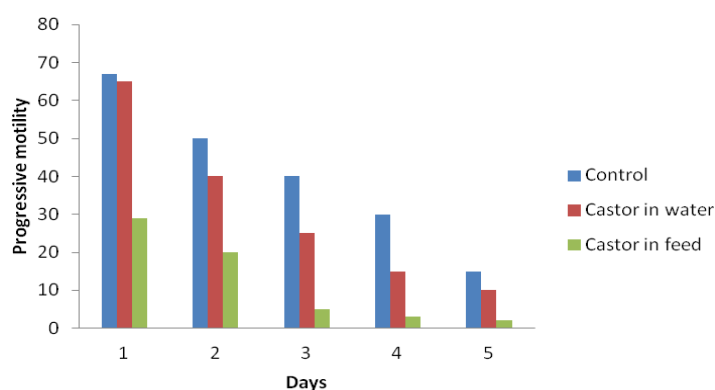


Figure 2. Effect of Castor Seed Meal on Progressive Motility of Cocks Spermatozoa

As shown from the results of this study, Fig. 3 revealed that T₂ and T₃ groups exhibited the highest numbers of abnormal spermatozoa. The higher percentage of abnormal sperms, which was observed in the cocks that were administered castor seed oil meal may be associated with lower motility observed in the cocks in T₂ and T₃ experimental groups. This positive correlation was detected by Kamar and Badreldin (1959) in Fayomi cocks.

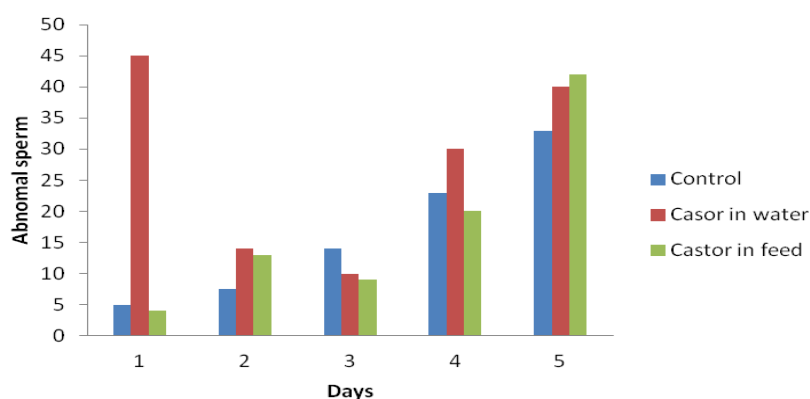


Figure 3. Effect of Castor seed Meal on Cocks Abnormal Spermatozoa

Conclusion

The results of the present study show that adding castor oil seed meal to diets of cockrel resulted in significant improvement with respect to body weight in

comparison with the addition of castor oil seed meal in the feed. It was concluded that castor oil seed meal holds some promise.

Acknowledgement

The authors wish to acknowledge the contribution of Dr. O J Jayeoba of Agronomy Department Nasarawa State University for Data analysis using GENSTAT..

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